days, so that the anxieties connected with the provision of fresh dressings during transport from the casualty clearing station to the base hospital are set aside. The question of treatment by vaccines can scarcely be efficiently dealt with within the limits of a short article. In any case the *rôle* of vaccines is to neutralise tissue poisons elaborated by bacteria, rather than to contribute directly to the closing and healing of the wound itself. The ideal vaccine would naturally be one which, injected into the body immediately after the wound is inflicted, has the power of getting in ahead of the toxins and neutralising them. This prophylactic action is possessed by one of the serums used, and fortunately in the case of one of the deadliest of the bacteria, the tetanus germ. It has been found that the use of this serum in a moderate dose immediately after the infliction of the wound protects the wounded man from tetanus, and consequently an important part of the treatment at the casualty clearing stations is the administration of this preventive dose. As regards the other bacteria, serums and vaccines are used, but their value is not so well established as in the case of tetanus, though important results have been obtained and valuable lessons learnt from their trial.

It will be seen from the above remarks that surgeons had not only to appreciate and elucidate a problem which at first presented many new and puzzling features, but also to devise means for its solution. How far they have been successful cannot be quite known until after the war. But enough experience has been gained to justify the hope that we are on the right track, and that the treatment our brave soldiers have a right to expect can now be given to them.

NOTES.

An article of immediate interest and importance appeared in our contemporary *La Nature* (February 17, p. 100) on the utility of supplying soldiers with body armour—a proposal which has been already urged in this country. The writer, "A. G.," states: (1) That in trench warfare nearly 75 per cent. of wounds seen in hospitals are caused by missiles of low velocity—such as could have been warded off by a comparatively thin armour-plate. (2) That missiles of low velocity which lodge in the body are more dangerous to life than missiles of high velocity which penetrate and leave the body, because every missile which lodges is presumably an infected body. (3) That the total mortality from head wounds has been enormously decreased since the introduction of protective helmets. The form of body armour proposed by the writer in *La Nature* is fully illustrated and compared with suits worn by soldiers in the Middle Ages. A cuirass of armour-plating is proposed for the protection of the thorax and upper abdomen, covering the most vital organs; a gorget of chain mail protects the neck, and a girdle or short "kilt" of the same material the loins and groins; there are a mask for the face, and sheaths for the shoulders, elbows, and knees. How far such an armour would interfere with mobility is a matter on which only military men can decide, but from a surgical point of view such a protection has every recommendation. We may here point out that a soldier of average stature presents, as he faces the enemy in open field, a target with an area of 2740 square cm. Of that target the head and neck make up 9 per cent.; the thorax and abdomen 28 per cent.; while the less vital parts—the limbs—make up the largest part, viz. 63 per cent. Even if only the more vital parts could be protected, there would be a great saving of life.

The Committee on Commercial and Industrial Policy, of which Lord Balfour of Burleigh is chairman, has recently forwarded to the Prime Minister a copy of resolutions passed on the subject of Imperial preference, and its report (Cd. 8482, price 1*d.* net), which includes a copy of the covering letter addressed to the Prime Minister, has been presented to Parliament. In the light of experience gained during the war, the committee contends that special steps should be taken to stimulate the production of foodstuffs, raw materials, and manufactured articles within the Empire, wherever this is possible, and it therefore recommends that preferential treatment should be accorded to the products and manufactures of the Colonies, either by exemption from, or reduction of, duties. Such recommendations from the committee, composed as it is of well-known representatives of politics, economics, engineering, metallurgy, trade, and industry, will no doubt carry considerable weight. There is, however, one direction in which this committee ought to be strengthened. Since the beginning of the war the importance of applied chemistry has become obvious to everyone, but it is not yet sufficiently realised by Government Departments and public officials that there are many industrial and economic questions in the consideration of which some knowledge of the science of chemistry and its applications, actual or potential, is indispensable. These questions cannot be handled with success by ordinary men of business, however able, without such knowledge, and it appears therefore eminently desirable that a duly qualified representative of chemical industry should be added to the committee.

Count Zeppelin is dead, and has left a name that brings to our minds the murder of innocent women and children in air-raids over open towns. Yet it must be admitted that his work in developing the rigid airship, in spite of many failures, is worthy of all praise. Count Zeppelin showed us how far the rigid airship can be developed, and the war has shown us the use and abuse of such aircraft. As scouts for the navy they are invaluable, being able to hover over one spot for lengthy periods without wasting their fuel reserves, a manœuvre impossible to an aeroplane. It is, however, clearly recognised that the use of airships for raiding open towns is quite indefensible, and that as a means of invasion they are very unlikely to prove a serious menace. In peace time they might be used to convey mails and passengers, but their speed is not higher than that of an express train, and their liability to destruction in bad weather is a serious objection to these uses. In spite of Count Zeppelin's painstaking labours, in face of great difficulties, it does not seem that his rigid airships are ever likely to be serious rivals of the aeroplane, either for military or commercial purposes.

It is interesting to learn that the Imperial Institute proposes to constitute a comprehensive bureau of mineral intelligence, with the object of supplying information as to all mineral deposits within the British Empire. For some years past the Imperial Institute has been doing a certain amount of such work, and it will be a decided advantage to have a mineral intelligence bureau available to the public. This subject has occupied the attention of several similar institutions. A paper dealing with the occurrence and distribution of certain of these minerals, read by Prof. Cullis before the Society of Engineers on December 11, 1916, was summarised in NATURE of January 4 (p. 361); and it is understood that the Department of Scientific and Industrial Research is also moving in the same direction. None of these attempts, however praiseworthy and valuable, can take the place of a properly established Government Department of Minerals and Metals, which should co-ordinate all these scattered efforts, and should deal with the whole subject from the point of view of a great Imperial industry, which is of vital importance to the future of the British Empire. This is surely a subject for the Government, and should not be left to the enterprise of individuals or associations, and there is probably no way in which public money could be expended with a better assurance of prompt and manifold reimbursement.

THE resignation of Dr. E. A. Letts from the chair of chemistry in the Queen's University, Belfast, is announced.

SIR W. E. GARSTIN and Sir G. K. Scott-Moncrieff have been elected honorary members of the Institution of Civil Engineers.

THE third Guthrie lecture of the Physical Society will be delivered in English at the Imperial College of Science and Technology on Friday, March 23, by Prof. P. Langevin. Its subject will be "Molecular Orientation."

THE twenty-second annual congress of the South-Eastern Union of Scientific Societies will be held at Reading on June 6–9, under the presidency of Prof. E. B. Poulton.

WE learn from *Science* that Dr. V. M. Slipher, for many years chief assistant at the Lowell Observatory, and known for his spectroscopic researches, has been appointed director of the observatory in succession to the late Percival Lowell.

THE *Times* announces that Dr. Douglas W. Freshfield, president of the Royal Geographical Society, has been elected an honorary member of the Russian Geographical Society, and Sir Ernest Shackleton a corresponding member.

WE regret to announce the death, on March 9, at eighty-eight years of age, of the Rev. O. Pickard-Cambridge, F.R.S., author of "Specific Descriptions of Trapdoor Spiders" (1873), "The Spiders of Dorset" (1879–81), and other works on arachnology, entomology, and general natural history.

WE are glad to be able to state that the announcement made at the meeting of the Linnean Society on February 15 as to the death of Prof. G. O. Sars, the distinguished zoologist of Christiania, is incorrect. The mistake arose from a confusion of his name with that of his brother, J. E. Sars, professor of history in the same university, who died recently.

THE Right Hon. Sir William MacGregor, late Acting High Commissioner for the Western Pacific; Sir William Peterson, principal of McGill University, Montreal; and Sir Ernest Rutherford, professor of physics, University of Manchester, have been elected members of the Athenæum Club under the provisions of the rule which empowers the annual election by the committee of a certain number of persons "of distinguished eminence in science, literature, the arts, or for public service."

LETTERS on the optical deterioration of the atmosphere during July and August last appeared in NATURE of October 5, November 9, and December 28, 1916. Father J. G. Hagen, director of the Vatican Observatory, writes to say that the defects referred to were severely felt at that observatory, and were attributed, as was done by Prof. Riccò in NATURE of November 9, to the eruption of Stromboli, which reached its maximum on July 4. Father Hagen has recorded these facts in the *Astronomische Nachrichten*, No. 4871.

THE following is the list of officers of the Physical Society elected for the ensuing year: *President:* Prof. C. Vernon Boys. *Vice-Presidents* (in addition to those who have filled the office of president): Mr. W. R. Cooper, Sir Napier Shaw, Dr. S. W. J. Smith, Dr. W. E. Sumpner. *Secretaries:* Prof. W. Eccles, Finsbury Technical College, Leonard Street, E.C.; Dr. R. S. Willows, The Sir John Cass Technical Institute, Jewry Street, Aldgate, E.C. *Foreign Secretary:* Dr. R. T. Glazebrook. *Treasurer:* Mr. W. Duddell. *Librarian:* Dr. S. W. J. Smith. *Other Members of Council:* Dr. H. S. Allen, Prof. E. H. Barton, Prof. G. W. O. Howe, Prof. J. W. Nicholson, Mr. C. C. Paterson, Mr. C. E. S. Phillips, Prof. O. W. Richardson, Dr. S. Russ, Mr. T. Smith, Mr. F. J. W. Whipple.

MR. JAMES GILLINGHAM, of Chard, recently presented to the County Museum at Taunton a large number of photographs and papers collected by him for the purpose of perpetuating the memory of John Stringfellow, of Chard, "the pioneer of flight and father of aviation." Nine of the photographs, mostly enlargements, are mounted on cards as follows: (1) Portrait of John Stringfellow; and (2) another as an old man; (3) Stringfellow's aeroplane, 1848; (4) his triplane, 1868; (5) another view of his triplane; (6) flower show and sports on Bewley Down, near Chard, the place where Stringfellow experimented with his flying-machine in 1847; (7) aeroplane designed by W. S. Henson and patented as "The Ariel Steam Carriage, 1842"; (8, 9) two photographs of the memorial to Stringfellow in Chard cemetery, designed by James Gillingham; in addition, the original drawing of the last-named subject, in large frame. At the present time these photographs are exhibited in a case in the Great Hall of Taunton Castle. The collection contains a good deal of miscellaneous manuscript and printed matter having reference to aviation, and includes the memorandum of agreement made by John Stringfellow and W. S. Henson with regard to a partnership for constructing "a model of an aerial machine," dated December 29, 1843.

BY the death of General J. A. L. Bassot, on January 17, international geodesy has sustained a severe loss, and France mourns a distinguished geodesist. Born in 1841, General Bassot took part in the war of 1870, and immediately after it was appointed to the Service Géographique de l'Armée, where, under General Perrier, he was employed on the remeasurement of the arc of meridian in France. Later, in 1879, he took part in the geodetic operations for connecting the triangulation of Spain with that of Algeria, where Bassot occupied the mountain station of Filhaoussen for nearly eight weeks before he could effect his purpose. In 1884 he laid out and observed the chain of triangulation from Algiers to Laghouat, and a few years later, in 1888, he succeeded his former chief, General Perrier, as director of the Military Geographical Service. Administrative duties now put an end to his geodetic work in the field, but he continued to direct and promote geodetic operations of importance, in spite of the arduous work and heavy responsibilities which the provision of maps for the French Army entailed. In these, too, he made numerous improvements. The remeasurement of the arc of meridian in France naturally suggested a revision of the arc of Peru, which had been measured in the eighteenth century in connection with the geodetic operations in France. A proposal to this effect was warmly supported by the International Geodetic Commission at its meeting at Stuttgart in 1898, and in June, 1899, work was commenced under the direction of General Bassot, and has since been carried to a successful termination. At several meetings of the International Geodetic Commission General Bassot presented reports on various geodetic operations, and at its meeting of 1903 he was elected president, which post he held until the commission automatically ceased to exist at the end of 1916, a few days before his death. On his retirement from the Army he became director of the Observatory of Nice in 1904, and devoted his energies to scientific work there and to his geodetic studies, besides taking part in an expedition to Spain in 1905 to observe the eclipse of the sun of that year. He was elected a member of the Académie des Sciences in 1893.

THE *Journal of Mental Science* for October, 1916, contains an interesting article by Prof. E. W. Scripture on "Reaction Time in Nervous and Mental Diseases." The fact that we judge whether a person is normal or not by our observations or how he reacts to his environment suggests that the study of nervous and mental diseases would be furthered by having some method by which we could study in detail the reactions of a patient to various stimuli. The usual reaction time apparatus is complicated, and involves much laborious calculation before the records can be utilised; it is therefore unsuitable for clinical work. The author of the article has devised, in order to obviate this, a self-recording method that shows directly to the eye, without measurement, how quick the reaction time is and how it varies. He gives details of records obtained with this apparatus from normal people and from patients suffering from alcoholism, hysteria, epilepsy, and general paralysis. The few diseases studied show marked reaction types, even for the simple form of reaction, and the author thinks that the test can be made so complete and trustworthy as to give an accurate diagnosis of many nervous diseases.

PROFS. M. BOULE and R. Anthony, in the *Journal of Anatomy* for January, make a spirited reply to Prof. Symington's strictures on deductions drawn from endocranial casts taken from human skulls. In their paper, "Neopallial Morphology of Fossil Men as Studied from Endocranial Casts," they contend that Prof. Symington's mistake lies in assuming, implicitly and without question, that what is true of modern men must also, necessarily, be true of Neanderthalians. As a matter of fact, they show that, while in modern man furrows are to be seen only at the base of such brain casts, in Neanderthalians these furrows are traceable on the frontal and occipital regions. They also show that in the case of the lemurs, and in carnivores and ungulates, endocranial casts show the neopallial foldings over the whole brain, which can be read on a cast nearly as easily, and with as much exactitude and precision, as on the surface of the brain itself.

ACCORDING to *Commerce Reports* (Washington) of June 12, 1915, nearly 400 square miles of seaweed-beds exist along the United States Pacific coast. From this area it is officially estimated that 59,000,000 tons of seaweed might be cut annually, from which 2,300,000 tons of potassium chloride could be produced. Arrangements have been made by the United States Department of Agriculture for experimental work on the production of potash from this seaweed to be carried out on a commercial scale. In the New York *Journal of Commerce* of November 24 (quoted in the *Journal of the Board of Agriculture,* February, p. 1158) it is stated that an appropriation of 175,000 dollars has been made for the purpose, and that the plant will probably be established in southern California, either at Santa Barbara or Long Beach. A plant capable of dealing with about 200 tons of wet seaweed per day will be erected, and a daily yield of about five tons of potassium chloride is expected. Numerous methods will be employed experimentally, but for the most part distillation processes will be used.

IN a recent communication from the National Health Insurance Commission (England) to the Board of Agriculture and Fisheries the opinion is expressed that of the many home-grown plants used in the treatment of disease only four can be regarded, from a medical point of view, as really essential—namely, belladonna, henbane, digitalis, and colchicum. The communication, which is published in the February issue of the *Journal of the Board of Agriculture,* proceeds further to give approximate estimates of the amounts of these essential plants required annually for home consumption, ranging from about 50 tons each of dried leaves and roots in the case of belladonna to about 20–25 tons each of dried leaves of henbane and digitalis, and a much smaller quantity of colchicum. It appears that there is sufficient digitalis and colchicum growing wild in this country to meet home requirements, and that a considerable proportion of the home demand for belladonna and henbane could also be met by the collection of wild plants with well-organised schemes for collection and drying. Moreover, the cultivated area under belladonna and henbane has considerably increased since the outbreak of war, and probably now suffices, together with the supplies obtainable from wild plants, for home requirements.

THE relation of the geographical conditions to the present situation in Mexico, as it may affect the United States, is the subject of some notes in the *Geographical Review* for January (vol. iii., No. 1). It is pointed out that the scene of action, if the United States intervenes in the affairs of Mexico, must be in the thinly peopled and arid northern frontier regions, where conditions are greatly in favour of the Mexicans. Water is scarce, and transportation of men, food, and materials will be difficult, which will handicap the Americans, but, on the other hand, will be correspondingly an advantage to the Mexicans, habituated to life in these desert conditions. A campaign in northern Mexico would therefore involve transport arrangements costly out of all proportion to the number of troops employed, and it would be far removed from the high plateau on which are situated nearly all the great cities of Mexico and most of its population. The article has a short but useful bibliography of geographical works on Mexico, and is accompanied by a map of the northern frontier regions.

IN a paper in the *Geographical Journal* for February (vol. xlix., No. 2) Mr. C. B. Fawcett has tried to devise administrative divisions for England and Wales more rational and more in harmony with local and regional consciousness than the divisions into counties. The aim of his divisions is to facilitate good local government. This entails certain considerations.

The boundaries must be drawn so far as possible along the more thinly peopled tracts of land. Each province must have a regional capital. This is essential to the development of a provincial patriotism necessary for good government. The minimum of population in each province should be about one million, and no province should be so populous as to dominate the others. It is a sound geographical principle that a valley forms a unity, and so boundaries should be drawn near watersheds. Lastly, as the new boundaries to some extent supersede the ancient counties, county patriotism must be allowed for in determining the new provinces. The result, as illustrated by a map, is to divide England and Wales into thirteen provinces centred respectively round London, Cambridge, Oxford, Southampton, Bristol, Plymouth, Cardiff, Birmingham, Nottingham, Leeds, Manchester, Newcastle, and an unchosen capital for the south-east province. While the various provinces are not intended to be equal in importance any more than they are in area, it is difficult to admit of any adequate division of Metropolitan England, to use Mackinder's term, which is, and must be, dominated by London. In the north the problem is easier.

We have received a copy of the Egyptian Almanac for the year 1917 (Government Press: Cairo). The almanac is descriptive rather than statistical, and so forms a complementary volume to the Annuaire Statistique. There are chapters on the geographical features, agriculture and industries, and on the work of the various public departments. The section on the antiquities department has been considerably extended, and contains a list of the principal antiquities and monuments of art. A transliteration system of Arabic is added to the almanac. It would have enhanced the usefulness of the volume if a list of maps published by the survey department had been added.

A renewal of wintry weather occurred in all parts of Great Britain on the three days March 7–9, and the cold snap was greatly intensified by a keen and searching easterly wind. Slight snow was experienced generally. On March 7 the highest day temperatures failed to rise above the freezing-point at most of the health resorts reporting to the Meteorological Office in the northern and eastern English districts. On March 8 the minima, or lowest temperatures, in the early morning were below 20° over Scotland, as well as at places in the north of England. At Aberystwyth the sheltered thermometer fell to 19° and at Bournemouth to 22°. In the London suburbs the lowest temperatures in the screen were generally about 22°, and at Hampstead the thermometer fell below 20°. The day temperatures were almost as low as on March 7. On the morning of March 9 the thermometer reading was again very low, registering 15° in parts of Scotland, and 20° at several stations in the east and south-east of England, as well as in the London suburbs. Much milder weather, with rain, set in over the south-west of England, and the change spread rapidly to other parts of Great Britain.

Communication 149 from the Physical Laboratory of the University of Leyden contains the results of the measurements of the specific heat at constant pressure of solid and liquid nitrogen carried out by Prof. Kamerlingh Onnes and Dr. W. H. Keesom. The pure nitrogen used was condensed and entered the calorimeter at a low temperature. It was there heated electrically through a range of temperature of about a degree, and the work done and the rise of temperature observed. The calorimeter was enclosed in a vacuum jacket kept at a low temperature to diminish the flow of heat from its surroundings. The atomic heat of the solid nitrogen at 15° Absolute is 1·6, at 20° 2·4, at 40° 4·5, at 50° 4·9, and at 60° 5·3. The atomic heat of the liquid nitrogen above the triple point 63° is 6·6 up to 76° Absolute.

A new list of small electric furnaces, for temperatures up to 1000° C., has just been issued by Messrs. A. Gallenkamp and Co., Ltd. These furnaces are characterised by a simplicity of construction and ease of manipulation which should render them of considerable value in chemical and other laboratories. The general advantages of electric furnaces are well known, but by many it may not yet be realised how much more convenient their use has become since the introduction of high-resistance, high-melting-point alloys, such as are employed in the apparatus referred to here. These materials enable small furnaces to be wound for use on voltages up to 250 (direct or alternating), while the low-temperature coefficient of the winding obviates the continued attention during heating-up that is demanded by a platinum or nickel wound furnace. In addition, the renewal of the heating tube, should breakdown occur through accidental over-running, is quickly carried out and at small cost. The types listed comprise a good selection of single and multiple tubular furnaces for combustion and explosion tube work. Muffle furnaces suitable for general chemical analysis and for small metallurgical operations are constructed on similar lines, while a vertical crucible furnace has recently been included in the list. This latter piece of apparatus is provided with a device for lifting the crucible from the heating tube from below —an arrangement which should greatly conduce to ease of working. The list gives useful information as to the power consumption for each size of furnace, while prices of renewal tubes and of suitable regulating resistances are quoted in each instance.

A pamphlet entitled "Slav Achievement in Advanced Science," by Prof. B. Petronievics, of Belgrade (American Book Supply Co., Ltd., 1*s*.), contains brief accounts of the following worthies: (1) Copernicus, (2) Boscovich, (3) Lobachevski, (4) Mendeléeff. They are all interesting, and (2) and (4) are particularly good. Even to an English reader (1) goes over familiar ground, and (3) contains blemishes in detail which make it rather untrustworthy. Thus from p. 19 the reader would infer that CD in the figure is a "straight" line; on p. 21 it appears as the locus of points "equidistant" from AB, and is, therefore, not a straight line. Riemann's "plane" (p. 22) cannot be *constructed* in Euclidean space, but we have an exact image of it in ordinary spherical geometry; *i.e.* we can translate any formula of the latter into a formula for the Riemann plane. Similarly, formulæ for the so-called pseudosphere in ordinary space can be applied to the geometry of a plane in Lobachevski's space. As illustrations of recent advance in scientific thought, we may remark that no one now would claim for Copernicus's theory any absolute superiority over Ptolemy's; it is only a matter of choosing axes of reference assumed to be fixed, and since the sun undoubtedly moves with reference to the fixed stars, the simplest explanation of celestial motions compels us to discard the Copernican axes, at any rate as a fixed system. Again, the theory of electrons has brought in a mathematical analysis which in some respects is analogous to Boscovich's. We are glad to learn that Prof. Petronievics is about to publish a work "On Simultaneous Discoverers"; this ought to be very interesting.

From the early days of the industries based on coal-tar products it has been fashionable to illustrate the derivation of synthetic dyes and other commercially important substances from coal-tar by diagrams somewhat on the lines of a genealogical table. This method of demonstrating the importance of coal-tar and the direct products of its distillation becomes increasingly difficult each decade, because of new developments which are constantly being made. Messrs. G. Allen and Unwin, Ltd., are responsible for the publication of one of the latest of these "coal-tar charts," which was adapted by Dr. T. H. Norton from a diagram originally drawn up by Dr. von Brunck, the veteran director of the Badische Aniline and Soda Company. In this chart the genesis of many important modern dyes is traced from six direct or immediate coal-tar derivatives, namely, benzene, toluene, the xylenes, naphthalene, phenol, and anthracene. Among the recent additions are the substantive wool dyes of the anthraquinone series, of which alizarine saphirol may be taken as type. The direct cotton-blues are valuable colours, the derivation of which from tolidine and dianisidine is indicated, and reference is made to some of the more important chromed colours. It is, however, significant of the rapidity with which these charts become obsolete, that in the present instance no place is found for the direct coal-tar product, carbazole, and its important derived colour, hydrone-blue.

The North-East Coast Institution of Engineers and Shipbuilders has just issued a standard specification for cargo-steamer engines. This specification is for reciprocating triple-expansion engines intended for moderate-speed cargo-boats engaged in general trade, and is based on the best practice of the day; the object in view is the ultimate standardisation of parts. It is hoped that the specification will be extended to include not only the main engine proportions and scantlings, but also the boilers, auxiliaries, and other details. The council proposes that an annual revision should be made in order that the specification may be kept thoroughly up to date. In view of the tasks which will have to be faced directly the war is over, the specification and proposals are of importance, and will tend to improve the organisation of our shipbuilding industry in this class of vessel.

OUR ASTRONOMICAL COLUMN.

Eclipse Test of Einstein's Theory of Gravitation.—At the meeting of the Royal Astronomical Society on March 9, the Astronomer Royal directed attention to the favourable opportunity which would be afforded by the total eclipse of the sun on May 28, 1919, for testing Einstein's predicted deflection of a ray of light in passing close to the sun. The theoretical displacement of a star near the sun is $1{\cdot}75'' \, r_0/r$, where r_0 is the sun's radius, and r the perpendicular distance of the ray from the sun's centre. At the eclipse of June, 1918, visible in the United States, the sun will be situated in a region poor in stars, but on May 28, 1919, it will be in the Hyades group. There will then be thirteen stars in the vicinity of the sun, of magnitudes 4·5 to 7·0, for which the theoretical displacements range from 1·20″ to 0·26″. The greater part of the track of this eclipse will unfortunately be over the Atlantic, not far from the equator, but, in view of the importance of the suggested observations, it is hoped that suitable observing stations may be found in Brazil or Liberia. A re-examination of the photographs taken by the Greenwich observers at Sfax in 1905 revealed three star images, and a possible fourth image involved in the corona, but no trustworthy deduction as to the reality of the Einstein effect could be made. These photographs, however, show that the standard astrographic telescope employed is quite a suitable instrument for the purpose in view.

The Variable Nebula N.G.C. 2261.—Dr. V. M. Slipher, director of the Lowell Observatory, has obtained a spectrogram of Hubble's variable nebula N.G.C. 2261, to which reference has previously been made in this column (Nature, vol. xc., p. 298). The nebula is of cometic form, and has the irregular variable star R. Monocerotis as its nucleus. The nebula and star have been found to show the same peculiar spectrum, consisting of a continuous spectrum with bright lines or bands which are not identical with those of gaseous nebulæ. The observation suggests that the nebula shines by reflected light of the pulsating nucleus. Mr. Lampland has obtained two direct photographs with the 40-in. reflector, one on March 2, 1916, and the other on January 25, 1917, showing striking differences in parts of the nebulous detail. The magnitude of the apparent changes suggests that no actual transference of matter takes place, but rather that we witness the progressive motion of pulses of light resulting from fluctuations in the brightness of the variable star. The displacement is estimated at 15 seconds of arc, and, assuming this to be perpendicular to the line of sight, which would generally overstate the distance, the parallax of the nebula would be about 0·00027″. The corresponding distance would be 12,000 light-years.

THE CHEMICAL ENGINEER.

The president and council of the Faraday Society are to be congratulated on their enterprise in organising a very successful debate on the training and work of the chemical engineer held on March 6, which supplements the discussion in November last on the same subject before the London section of the Society of Chemical Industry. The importance of a knowledge of engineering to the chemist engaged in industry was accepted by all present, but the speakers showed a great difference of opinion in their definition of the chemical engineer. Sir George Beilby, who initiated the discussion, considered that chemical engineering has for its function the design and construction of apparatus required for the carrying out of chemical processes on a manufacturing scale. The chemical engineer is a specialist who not only has at his command a sound knowledge of chemical phenomena and laws, but, more important still, he must be able to see chemical problems from the chemist's point of view.

Prof. Donnan drew a distinction between research chemists, engineer-chemists, and chemical engineers, using the last term in the same sense as Sir George Beilby. The engineer-chemist is the ordinary chemical student to whom a good deal of engineering knowledge has been imparted, or, as Prof. Donnan termed it, applied physical chemistry. He corresponds to what is usually known as the plant chemist in chemical industry—that is, the trained chemist who has naturally mechanical aptitude and has gained engineering knowledge by experience. Prof. Donnan's desire was to include a comprehensive training in engineering in the four years' course for chemists. It was suggested that some attempt should be made by the teacher at the end of three years to state as to what branch of chemistry a particular student showed the greatest aptitude. Prof. Donnan very properly laid considerable stress on the rarity of the really gifted research worker, who was born rather than made by training.

Even more important in this connection was Sir